Cassini, VLA and DSN Observations of Jupiter's Synchrotron Emission

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On route to Saturn, the Cassini spacecraft's flyby of Jupiter provided the first opportunity to map Jupiter's synchrotron radiation at a 2 cm radio wavelength. Previous radio maps at longer wavelengths (6, 13 and 20 cm) using earth-based radio telescopes measured emission from the relativistic electrons trapped in Jupiter's inner radiation belts. The shorter wavelength used by the Cassini Radar instrument, operating in radiometer mode, will measure emission from electrons at higher energies than previously possible (as high as 50 MeV). Earth-based radio telescopes have difficulty retrieving the synchrotron emission at 2 cm wavelength from their observations due to the inability to separate clearly the strong atmospheric thermal emission from the relatively weak synchrotron radiation. The Cassini observations are complemented by a ground-based campaign involving the VLA (operating at 20 and 90 cm) and the NASA's Deep Space Network antennas (operating at 2.3, 8.5, 13.8, and 32 GHz). The combined data set will provide new information on the energy spectrum and distribution of relativistic electrons trapped in Jupiter's radiation belts. Results from Cassini Radar instrument, the VLA and the DSN observations will be presented.

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